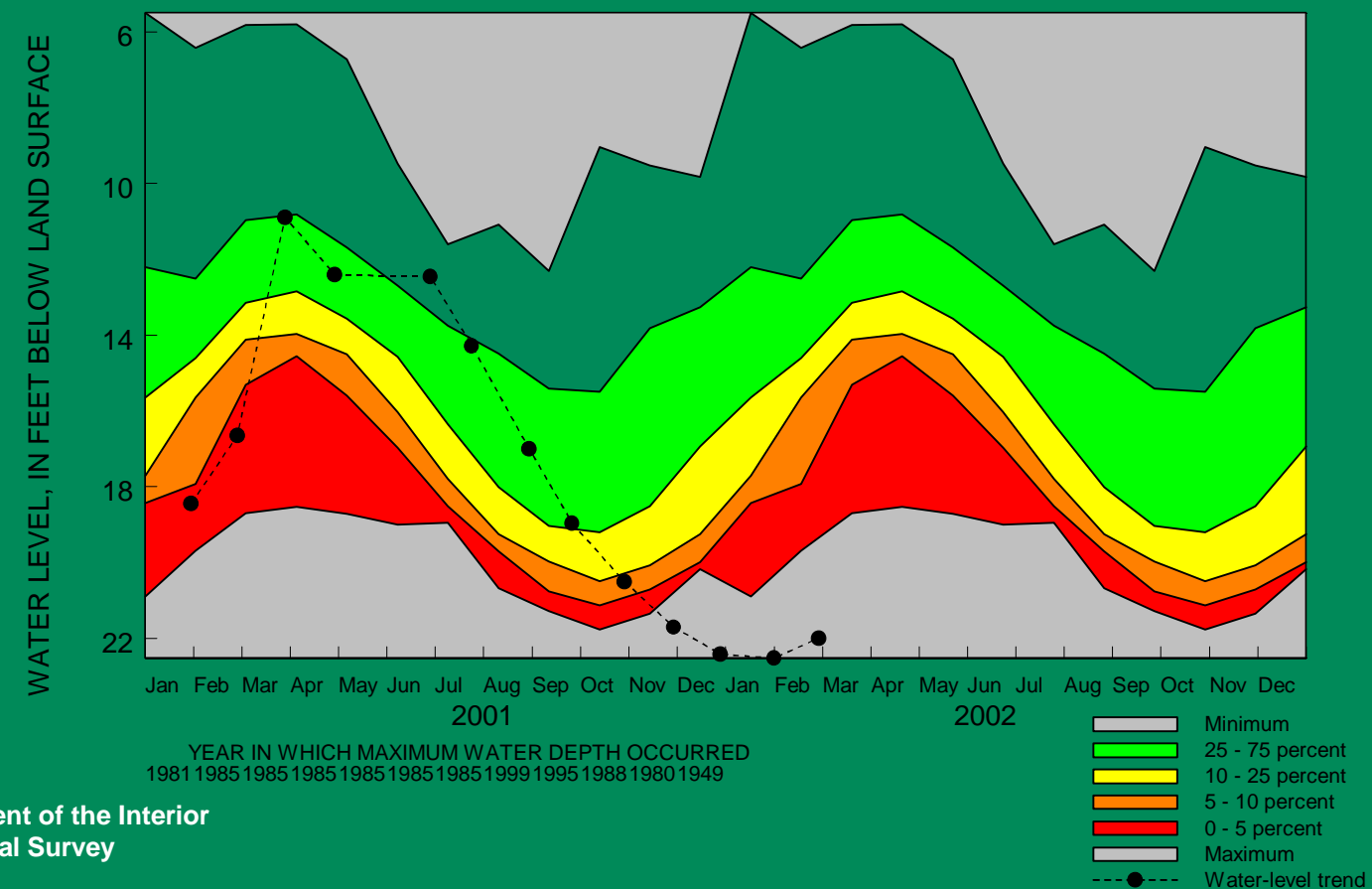




Drought conditions in Connecticut

Long-term water levels in USGS well WB-198, Waterbury, CT



U.S. Department of the Interior
U.S. Geological Survey

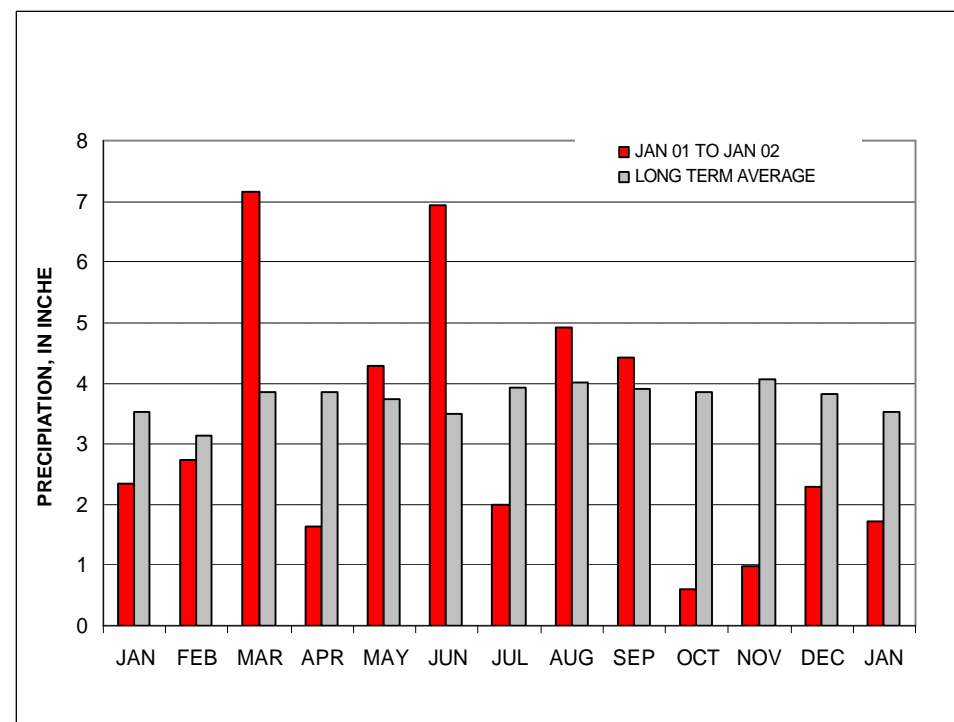
The significance of a drought depends on your point of view.

- Low soil moisture can lead to poor growing conditions for farmers
- Low reservoir levels can lead to water restrictions
- Low streamflow can mean loss of habitat and loss of recreational opportunities
- Low ground-water levels can mean that wells go dry
- Low ground-water levels also can mean that summer streamflow will be low

What causes low water levels?

- Normal seasonal fluctuation
- Extended periods of below-normal rainfall
- Lack of ground-water recharge
- Overuse of water resources

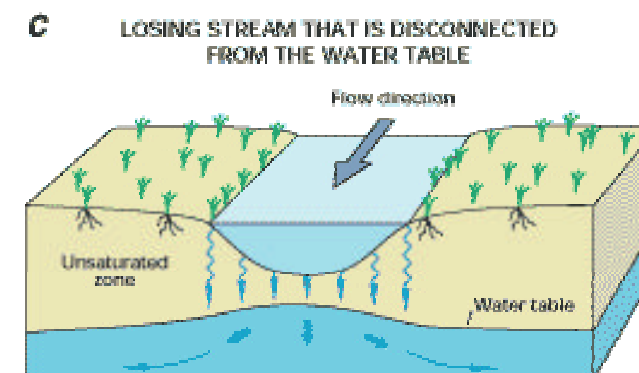
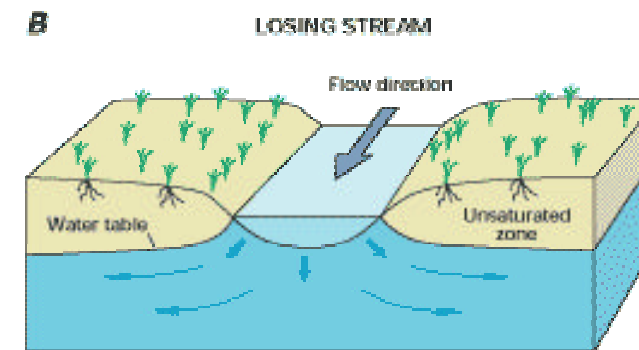
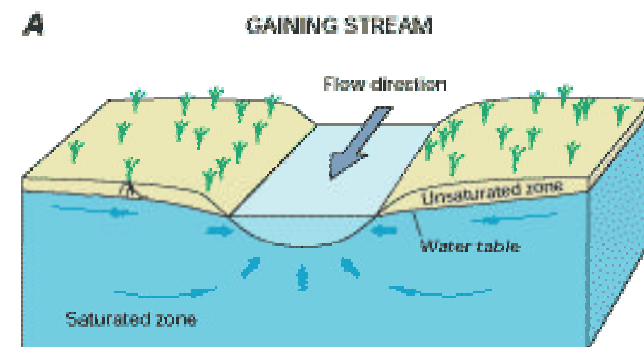
Precipitation from October 2001 through January 2002 was significantly below normal in Connecticut



- Average monthly precipitation from 1895 to 2000 (gray bars) is distributed evenly through the year.
- In any given year, precipitation may not be evenly distributed (March was very high in 2001; April was very low)

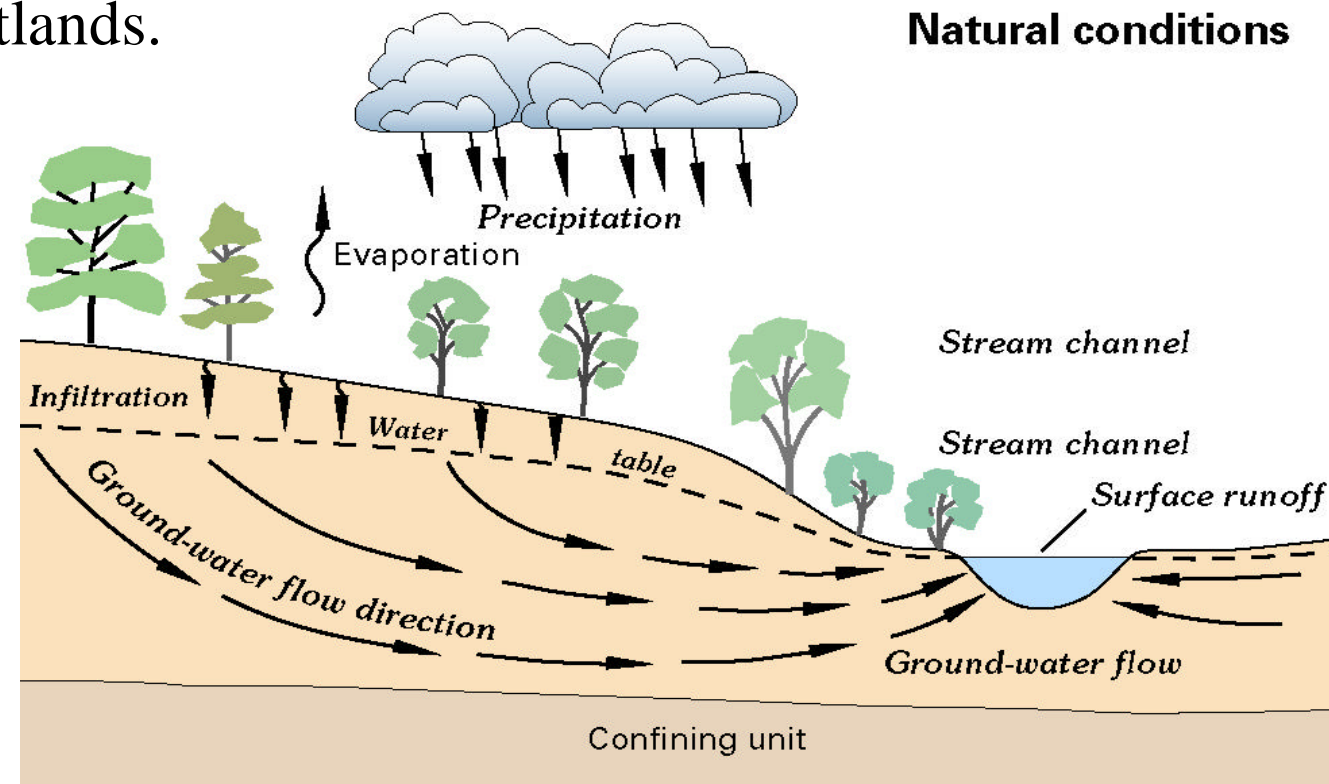
How are surface water and ground water related in a drought?

- Ground water serves as a large reserve of subsurface water.
- Streams and other surface-water bodies may either gain water from ground water (A) or lose (recharge) water to ground water (B and C).



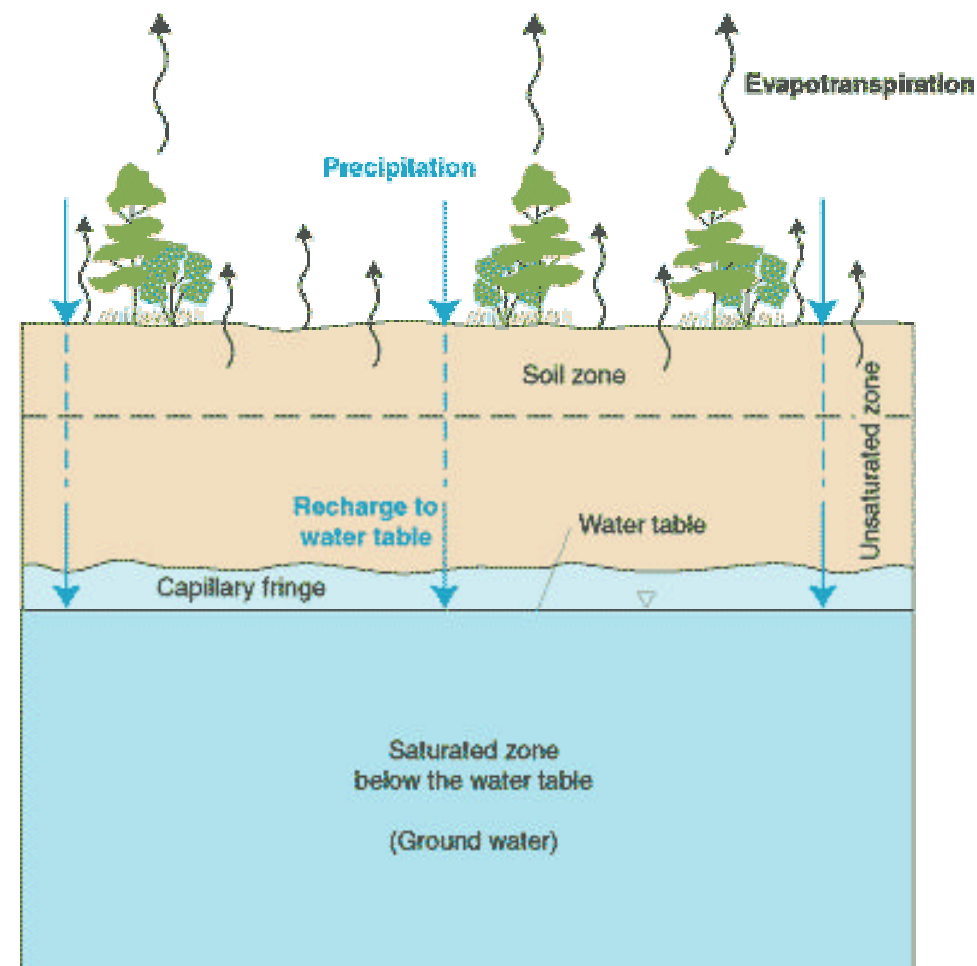
Ground water commonly is an important source of surface water.

- The contribution of ground water to total streamflow varies widely among streams, but hydrologists estimate the average contribution is somewhere between 40 and 50 percent in small and medium-sized streams.
- Ground water also is a major source of water to lakes and wetlands.



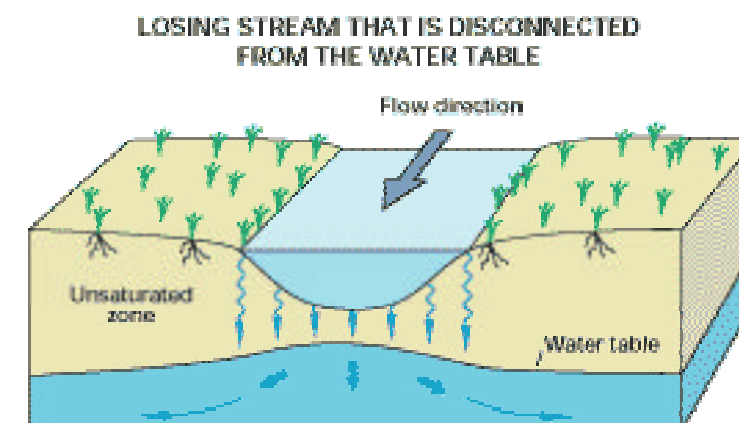
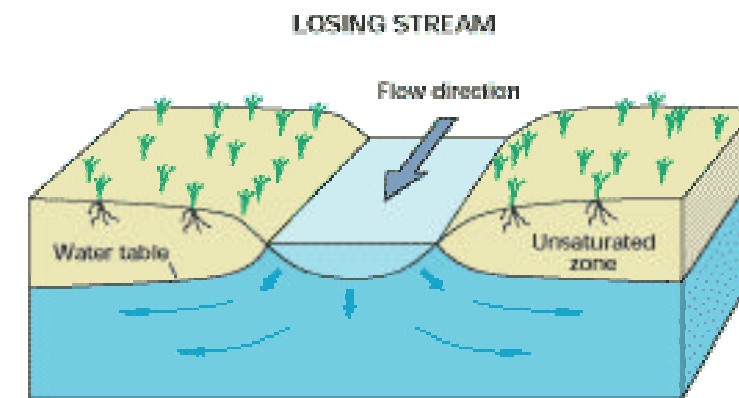
Natural sources of freshwater that become ground water

- 1) Areal recharge from precipitation that percolates through the unsaturated zone to the water table, and

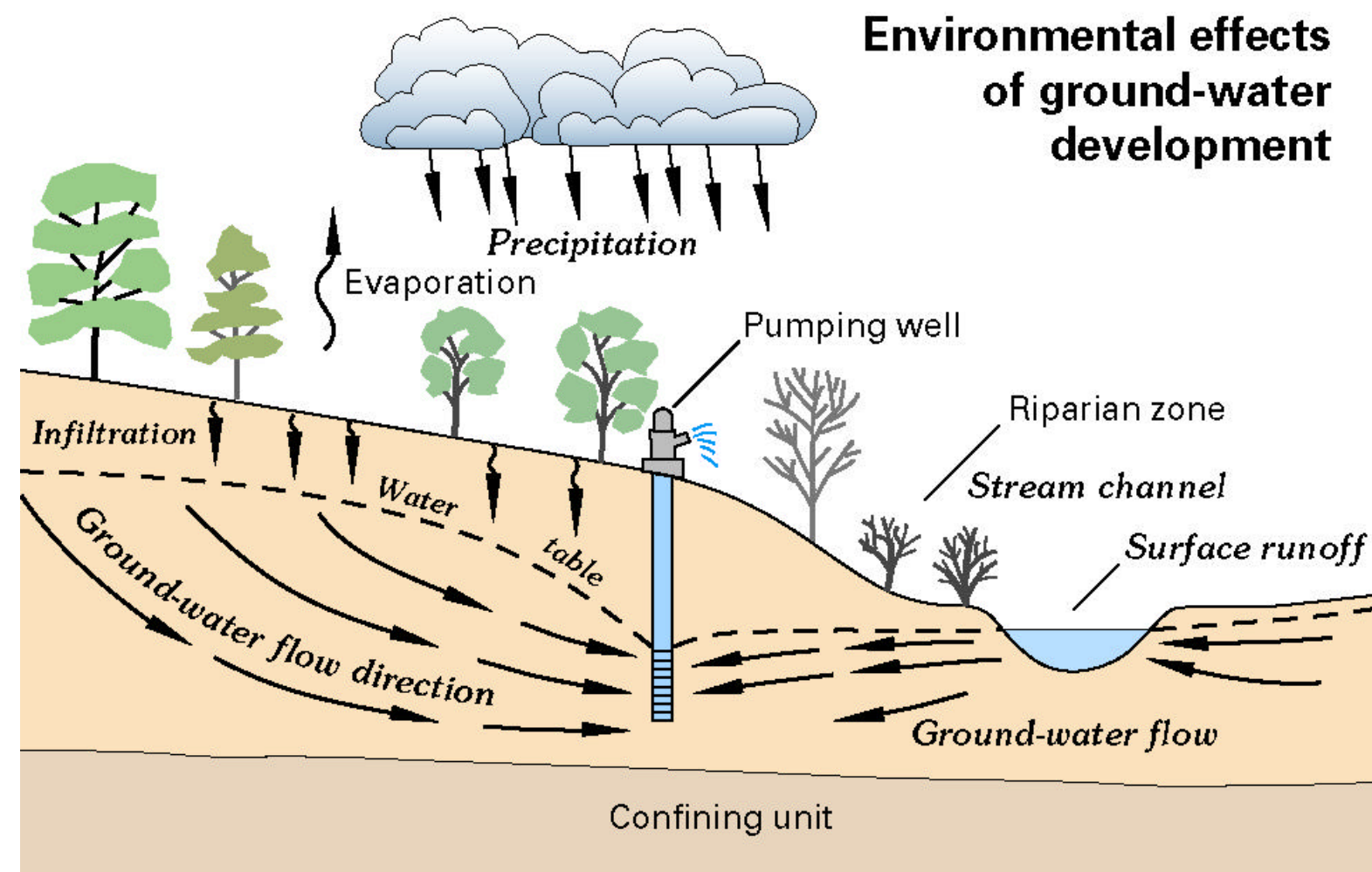


Natural sources of freshwater that become ground water

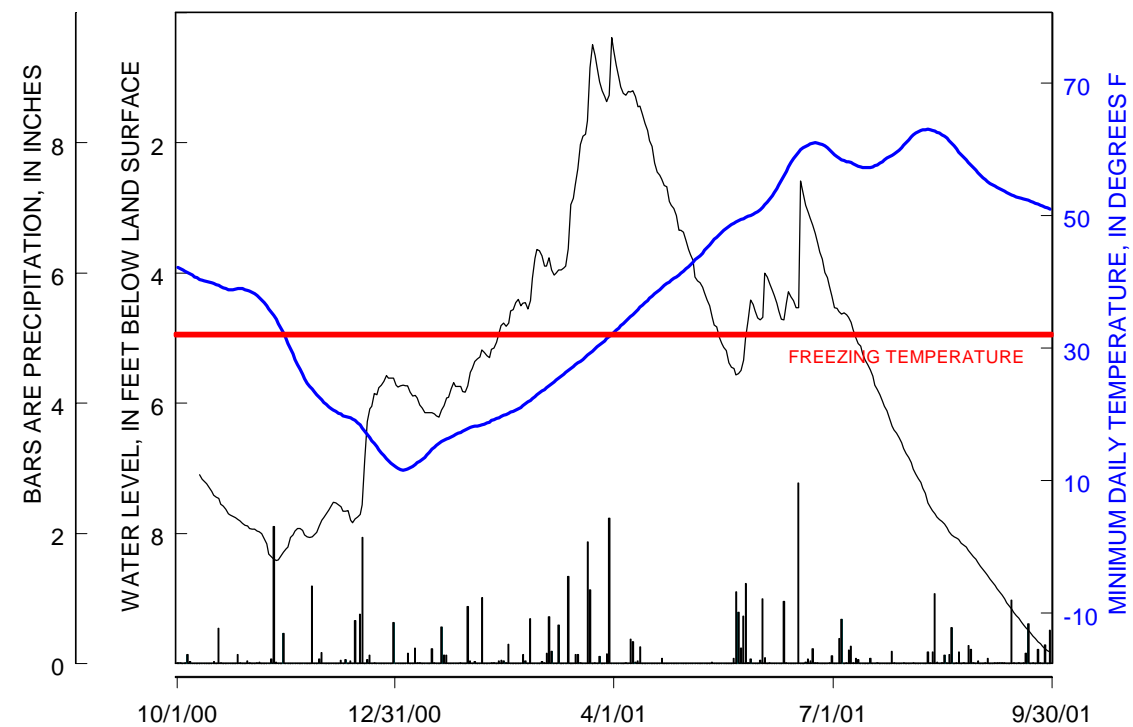
- 2) Losses of water from streams and other bodies of surface water such as lakes and wetlands.



Pumping a well near a river also can recharge ground water



Water levels in USGS observation well MB-32 (Marlborough, CT)



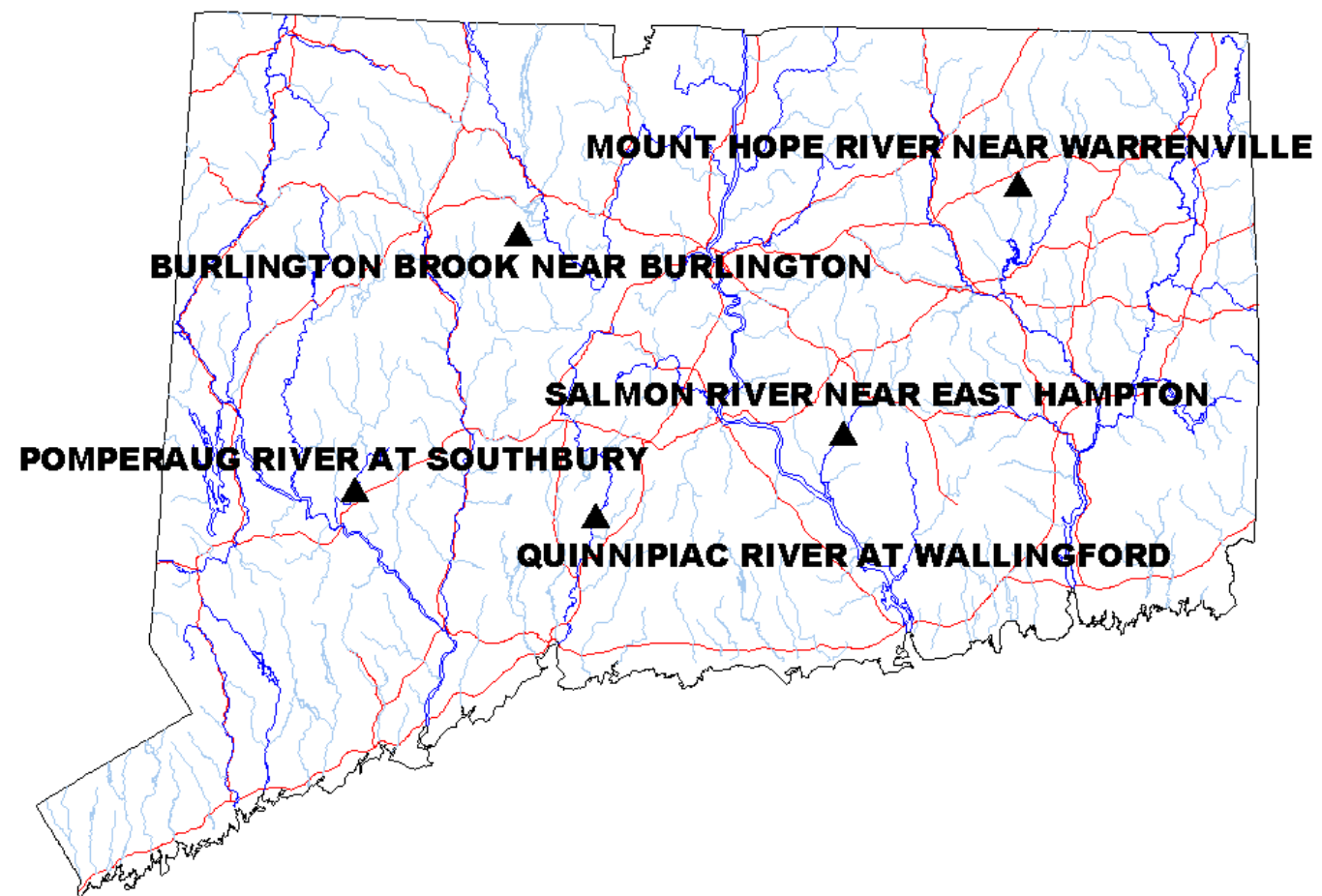
- Ground water fluctuates seasonally, in MB-32 by about 10 feet
- Ground levels generally tend to rise (ground-water recharge) when minimum daily temperatures fall below freezing and fall when minimum daily temperatures rise above freezing

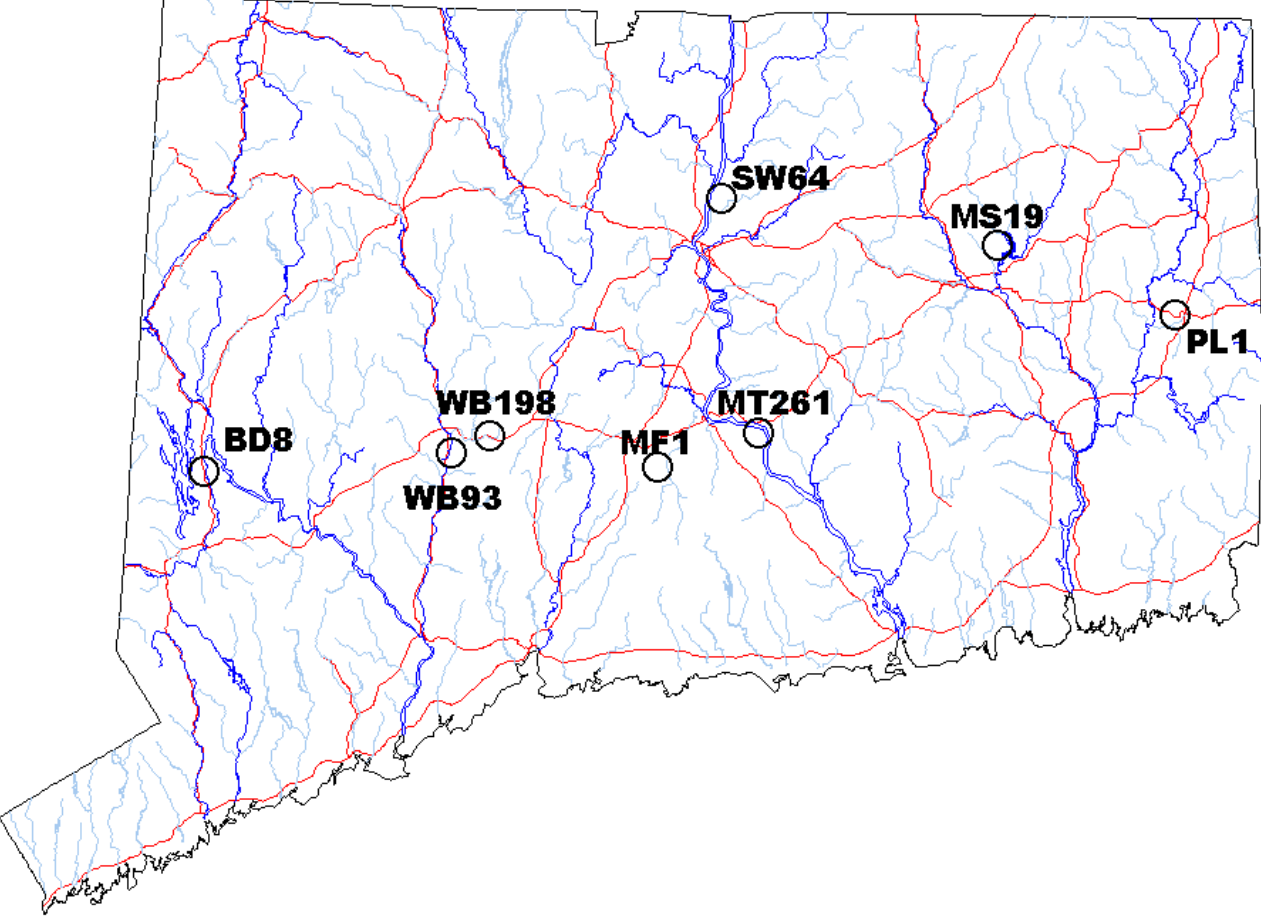
The most severe drought in the 20th century
in Connecticut was in the mid-1960s

- A drought of the magnitude of the mid-1960s drought is estimated to recur once every 50 years or longer
- Other droughts in Connecticut were in 1894, 1911, 1929-32, 1940-45, 1957, 1981, and 1985
- Droughts may occur more often because of changing climate, according to the National Global Climate Change Research Program (<http://www.necci.sr.unh.edu/2001-NEERA-report.html>)

What do we know about drought and water levels this year?

- The USGS has a network of 50 continuous streamflow-gaging stations and 71 ground-water observation wells (measured monthly)
- Data from USGS networks can be analyzed in the context of long-term records and historical droughts
- Continuous streamflow has been measured at 33 of the 50 USGS gaging stations since the 1960s
- Water levels have been measured at 14 of the 71 USGS observation wells since the 1960s





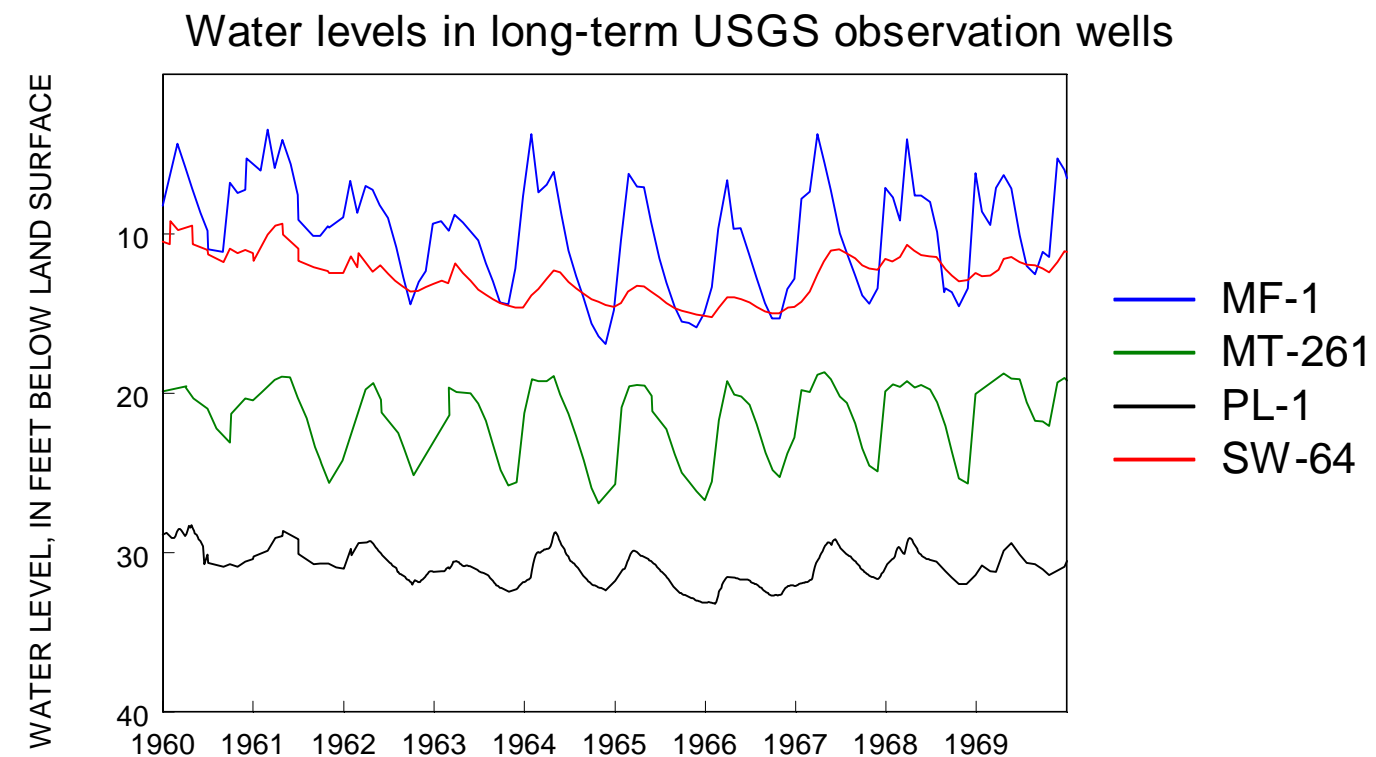
ells

Characteristics of selected long-term water-level observation wells

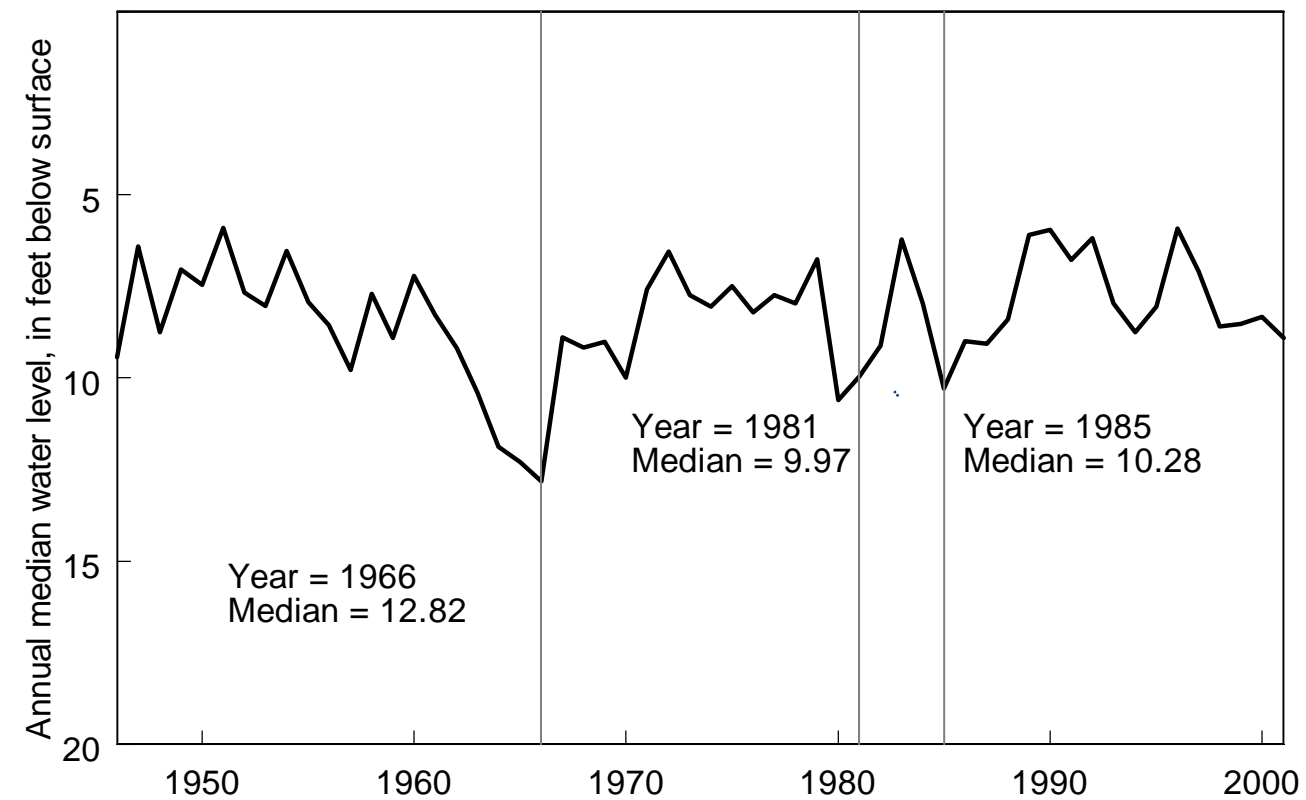
Well	Topographic setting	Date record began	Type of well	Depth of well, in feet	Frequency of measurement	Town	Aquifer material
BD-8	Valley terrace	Dec-66	Bored	52.8	Monthly	Brookfield	Stratified glacial
MF-1	Hillside	Jul-46	Dug	22.0	Monthly	Middlefield	Till
MS-19	Valley terrace	May-58	Dug	21.0	Monthly	Mansfield	Stratified glacial
MT-261	Valley terrace	Mar-56	Dug	27.6	Monthly	Middletown	Stratified glacial
PL-1	Valley terrace	Oct-42	Dug	34.0	Monthly	Plainfield	Stratified glacial
SW-64	Valley terrace	Oct-48	Dug	18.0	Monthly	South Windsor	Stratified glacial
WB-198	Valley terrace-hillside	Feb-44	Dug	32.6	Monthly	Waterbury	Stratified glacial
WB-93	Hillside	Feb-44	Dug	30.9	Monthly	Waterbury	Till

Water levels in wells respond to droughts differently based on, in part, the geology and topography at the well

- Ground-water levels fluctuate seasonally, even in a severe drought
- The mid-1960s drought lasted several years. The biggest change in yearly low water levels was only about 6 feet. **A small change in ground-water levels indicated major water shortages.**



Annual median water levels in well MF-1



- The median water level fluctuates from year to year
- The median water level in the 1960s was a result of several years of below-normal precipitation
- Other droughts occurred in 1981 and 1985